REMARKS

This Amendment submits a proposed new Fig. 7; amends the specification to refer to new Fig. 7; amends claims 23, 29, 30, and 34; and adds new claims 36-43 in accordance with the original disclosure. Support for the amendments and new claims is found, for example, in the specification at page 14, line 33 to page 16, line 3; page 17, line 21 to page 18, line 21; page 27, line 17 to page 30, line 20; and in Figs. 3 and 5. Claims 22-24 and 28-43 are now present in this application.

Objection to the Drawings

The drawings were objected to for not showing the claimed "control ratio", the "control parameters", and the "droplet distribution". Examiner Kim is thanked for the courtesies extended to the undersigned in the telephone conference conducted on January 15, 2004 to discuss these objections. A proposed drawing correction adding new Fig. 7 is enclosed herewith. Support for Fig. 7 is found in the specification at page 17, line 21 to page 18, line 21. Applicant has not added additional disclosure to the specification but, rather, has simply inserted reference numbers into the original text. Therefore, claim 7 is believed fully supported in the original disclosure and does not constitute new matter.

Approval of new Fig. 7 is respectfully requested.

Rejections Under 35 U.S.C. § 112

Claims 23, 24, and 28-35 stand rejected for indefiniteness for the reasons set forth in paragraph 4 of the Office Action. As set forth above, Applicant has amended the claims to address the cited indefiniteness. Reconsideration of the rejections is respectfully requested.

Rejections Under 35 U.S.C. § 102(b)

A. Claim 22

Claim 22 stands rejected for anticipation by U.S. Patent No. 4,148,932 to Tada et al. In view of the above amendments and

the following remarks, reconsideration of this rejection is respectfully requested.

As discussed in the pending application, a problem associated with known coating application methods is achieving a uniform coating over substrates in production methods using multiple coating applicators. In the present invention, multiple applicator performance is managed using individual atomizer control values but selected control parameters are constrained by a single mathematical "control ratio" of optimized atomization energy to coating flow rate to control the multiple applicators. Thus, a uniform control technique is provided for managing multiple spray applicators used in unison in a coating system. Particularly, the inventor has discovered that there is a relationship between the droplet size and/or distribution of the droplets discharged from an atomizer and the ratio of atomization energy to coating flow rate for the atomizer.

With respect to claim 22, claim 22 discloses a method of controlling a multi-bell applicator coating system comprising controlling bell cup rotational speed, shaping air volume, and coating delivery rate to the bell applicators in the coating system such that each bell applicator produces a coating droplet size having a dominant droplet size peak at about 40% to about 70% concentration of about 15 to about 40 microns.

The Examiner discusses his reasons for rejecting claim 22 based on Tada in paragraph 6 of the Office Action. Applicant respectfully disagrees with the Examiner's characterization of Tada.

Tada is directed to a method of atomizing liquid paint without the generation of foam. Tada uses a particular applicator structure in which the liquid paint is led in the form of a thin continuous film along one surface of the Tada rotary atomizing device and is formed into a multiplicity of narrow branching streams separated from one another in the circumferential direction (Tada at column 3, lines 45-60). One way of producing this effect is to form shallow grooves 8 on the surface over which the liquid flows.

Tada does not teach or suggest the claimed invention of controlling bell cup rotational speed, shaping air volume, and coating flow rate to obtain a particular droplet size distribution. While the Examiner cites Tada at column 4, lines 23-33 for disclosing the claimed droplet size ("several tens of microns"), this thickness refers to the thickness of the liquid paint film flowing along the surface of the device not the droplet size upon atomization. Additionally, Tada does not teach or suggest the claimed droplet size distribution having a dominant droplet size peak at about 40% to about 70% concentration of about 15 to about 40 microns. Fig. 9 of Tada discloses the distribution of atomized paint droplets (Curve I) using the Tada device. As can be seen from the figure, the dominant droplet size peak for Tada is around 100 microns, which is well above the claimed range of 15 to 40 microns. Therefore, for all of the above reasons, claim 22 is not anticipated by Tada. Reconsideration of the rejection of claim 22 is respectfully requested.

B. Claims 28, 31, and 32

Claims 28, 31, and 32 stand rejected for anticipation by U.S. Patent No. 3,512,502 to Drum. In view of the above amendments and the following remarks, reconsideration of these rejections is respectfully requested.

Claim 28 is directed to a method of controlling multiple applicators in a coating process comprising (a) defining a control ratio of atomization energy to coating flow rate for the coating process, and (b) controlling multiple applicators such that the applicators substantially maintain the control ratio during the coating process.

Drum is directed to a method of obtaining a uniform deposited coating using sprayers producing an annular spray pattern. In order to achieve this coating, Drum discloses a modified spraying electrode 12 having an inner electrode 28 carried by a plastic member 29. The plastic member 29 has a great influence in control of the annular pattern produced by the spraying electrode 12.

However, Drum does not teach or suggest defining a control ratio of atomization energy to coating flow rate for a coating process. It appears that Drum simply has multiple applicators attached to a delivery system. Additionally, Drum does not teach or suggest controlling the applicators to maintain the control ratio during the coating process. Therefore, claim 28 is not taught by Drum. Reconsideration of the rejection of claim 28 is respectfully requested.

Claims 31 and 32 depend directly or indirectly from claim 28. Claim 31 depends directly from claim 28 and includes the limitations of choosing applicator control parameters that provide a desired coating and utilizing the control parameters to define the control ratio. Claim 32 depends from claim 31 and further defines how the applicator control parameters are chosen. Drum simply discloses a coating station and does not teach or suggest defining a control ratio to control the applicators nor how the control parameters are defined or chosen, as claimed in claims 31 and 32. Therefore, for all of the above reasons, claims 31 and 32 are not believed anticipated by Drum.

Rejections Under 35 U.S.C. § 103(a)

Claim 33 is rejected for obviousness over the teachings of Drum in view of the teachings of Tada. In paragraph 9 of the Office Action, the Examiner contends that Drum discloses the limitation of the claimed invention with the exception of droplet size, which is taught in Tada. However, as discussed above, the portion of Tada cited by the Examiner refers to the thickness of the coating film flowing along the surface of the applicator and not the droplet size of the resulting atomized droplets. Additionally, Applicant respectfully disagrees with the Examiner that Drum discloses the invention of claim 33 (which depends from claim 28) for the reasons discussed above with respect to claim 28. Therefore, reconsideration of the rejection of claim 33 is respectfully requested.

Discussion of Non-considered Claims

The Examiner did not address the patentability of claims 23, 24, 29, 30, 34, or 35 under the prior art.

Claim 23 is directed to a method of controlling a multi-bell applicator coating system comprising (a) determining bell rotational speed, shaping air supply, and coating flow rate values for a bell applicator to produce a desired droplet uniformity; (b) using the values from step (a) to define a control ratio defined as rotation speed multiplied by shaping air supply divided by coating flow rate; and (c) controlling rotational speed, shaping air supply, and coating flow rate of the bell applicators of the multi-bell system to substantially maintain the control ratio for individual applicators of the multi-bell system.

Thus, claim 23 is particularly directed to a multi-bell applicator coating system and claims the method of controlling these bell applicators of the coating system by first defining a particular control ratio and then controlling the rotational speed, shaping air supply, and coating flow rate of the bell applicators of the multi-bell system to maintain that control ratio. Such a method of controlling the individual applicators of a multi-bell system is neither taught nor suggested in the cited prior art and, therefore, claim 23 is neither anticipated nor rendered obvious by the cited references.

Claim 24 depends from claim 23 and further includes the limitation that the desired droplet uniformity has a dominant droplet size peak at about 40% to about 70% concentration of about 15 to about 40 microns. Again, this specific limitation is neither taught nor suggested in the cited prior art.

Claims 29 and 30 depend from claim 28 and are believed patentable for the same reasons discussed above with respect to claim 28. Additionally, claim 29 recites a specific control ratio for a bell applicator system and claim 30 recites a specific control ratio for a gun applicator system. These limitations are neither taught nor suggested in the cited prior art.

Claim 34 is directed to a method of controlling multiple bell applicators in a coating process comprising choosing applicator control parameters to provide a desired coating, defining a control ratio of atomization energy to coating flow rate based on the chosen control parameters in accordance with the disclosed formula, and then adjusting the control parameters for the applicators to maintain the defined control ratio during the coating process. As described above, the claimed method of controlling multiple bell applicators by choosing applicator control parameters to provide a desired coating and then defining a control ratio based on the specific ratio defined in claim 34 and then adjusting the control parameters for the applicators to maintain that control ratio during the coating process is neither taught nor suggested in the cited prior art.

Claim 35 depends from claim 34 and further limits the droplet distribution to have a 40% to about 70% distribution of the droplets being about 15 microns to about 40 microns in size. Again, this specific limitation is neither taught nor suggested in the cited prior art.

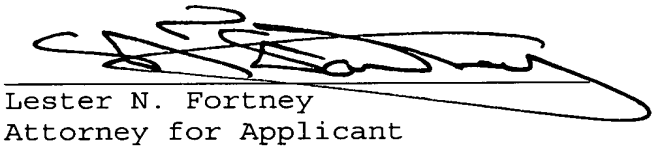
New Claims 36-43

New dependent claims 36-43 have been added to the application. Claim 36 depends from claim 22. Claim 38 depends from claim 23. Claim 40 depends from claim 28. Claim 42 depends from claim 34. Claims 36, 38, 40, and 42 further limit the respective independent claims from which they depend by providing that the coating is formed by dynamically mixing a plurality of waterborne coating components and supplying the dynamically mixed coating components to the coating system. Dependent claims 37, 39, 41, and 43 depend from claims 36, 38, 40, and 42, respectively, and further limit that the coating components are of differing color.

Conclusion

In view of the above amendments and remarks, Applicant believes claims 22-24 and 28-43 are patentable over the cited prior art and are in condition for allowance. Approval of proposed new Fig. 7, reconsideration of the rejections of claims 22-24 and 28-35, and allowance of all of claims 22-24 and 28-43 are respectfully requested.

Respectfully submitted,



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